Claims

1. A sealing system for creating a fluid barrier-type seal between two interfitting structures, said sealing system comprising:

a spring in the form of an annulus;

a seal ring in the form of an annulus, wherein said seal ring has a radially-located outer surface that faces away from a center axis of said seal ring and, when viewed in radial cross-section, includes an outwardly-protruding, arcuately-shaped first portion and a trailing second portion, and wherein said seal ring has a radially-located inner surface that faces toward said center axis and includes first and second portions separated by a groove; and

wherein when said spring is placed within a complementary endless groove located on an outer surface of a first structure, and said seal ring is then placed in said groove in a manner wherein it overlies said spring, and wherein when said first structure is inserted into a second structure that has an inner surface that presses on said outer surface of said seal ring, the arcuately-shaped first portion of said outer surface of said seal ring will be pressed inwardly toward said spring, thereby compressing said spring and causing at least a portion of said seal ring to flex about said groove in said seal ring and cause a reorientation of the seal ring's outer surface.

2. The sealing system of Claim 1 wherein said spring is in the form of a canted-coil spring.

3. The sealing system of Claim 1 wherein when said outer surface of said seal ring becomes reoriented, it assumes a flattened shape that substantially matches the inner surface of said second structure.

4. The sealing system of Claim 1 wherein said seal ring, when in a non-compressed state, has an 'L'-shaped radial cross-section.

5. The sealing system of Claim 4 wherein after said spring and said seal ring are placed within said groove in the outer surface of said first structure and said first structure is inserted within said second structure, if said second structure is then caused to contain a fluid with the sealing system preventing fluid from leaking out of said second structure, the seal ring will be oriented whereby the top end of the 'L' of the seal ring's 'L'-shaped cross-section will face the fluid, and be acted upon by the fluid's pressure, while the foot portion of the 'L' will be forced into a wall of said groove of said first structure.

6. The sealing system of Claim 1 wherein said second portion of the seal ring's outer surface, when viewed in cross-section, is

in the form of a substantially straight line and, when in an unloaded condition, has a first orientation relative to an adjacent side surface of said seal ring, and wherein when said spring and said seal ring are located in said groove of said first structure and said first structure is inserted into said second structure, said first orientation will change and said second portion of the seal ring's outer surface will become substantially perpendicular to the adjacent side surface of said seal ring.

7. The sealing system of Claim 1 wherein the seal ring is made of a material that is at least partially made up of PTFE.

8. The sealing system of Claim 1 wherein prior to the seal ring's installation into said groove of said first structure, a radially-oriented cross-section through a portion of the seal ring will show the first portion of said inner surface of the seal ring as a straight line that is substantially parallel to the seal ring's center axis.

9. The sealing system of Claim 8 wherein after the spring and seal ring have been installed in said groove of said first structure and said first structure is placed within said second structure, a radially-oriented cross-section through a portion of the seal ring will show the first portion of said inner surface

of the seal ring as a substantially straight line that is at a significant angle relative to the seal ring's center axis.

10. The sealing system of Claim 1 wherein once said spring and said seal ring are placed within said groove of said first structure and said seal ring overlies said spring, a portion of said second portion of the seal ring's inner surface will contact a portion of said spring and be oriented at an angle that substantially matches the orientation of said portion of said spring.

11. The sealing system of Claim 1 wherein prior to said first structure being inserted into said second structure, when said seal ring is installed in said groove and overlies said spring, both of said first and second portions of the seal ring's inner surface will be in contact with said spring, wherein said inner surface's first portion will have a first area of contact with said spring and said inner surface's second portion will have a second area of contact with said spring, and wherein both of said first and second areas of contact will be located substantially adjacent said groove in said inner surface of said seal ring.

12. The sealing system of Claim 11 wherein after said first structure is inserted into said second structure and while said outer surface of said seal ring is contacting said inner surface

of said second structure, the first area of contact between the first portion of the seal ring's inner surface and the spring will be spaced from said groove in said inner surface of said seal ring.

13. The sealing system of Claim 1 wherein said seal ring can be installed in said groove in said first structure without being cut.

14. A sealing system for creating a fluid barrier-type seal between two interfitting structures, said sealing system comprising:

a canted-coil spring in the form of an annulus;

a seal ring in the form of an annulus, wherein said seal ring has a radially-located outer surface that faces away from a center axis of said seal ring and includes, when viewed in a radial cross-section, an outwardly-protruding minor portion in a leading position and a substantially straight major portion in a trailing position, and wherein said seal ring has a radially-located inner surface that faces toward said center axis and includes first and second portions separated by a groove, wherein said first portion accounts for a major portion of said inner surface and wherein said second portion includes first and second connected segments; and

wherein said spring is capable of being placed within an

endless groove located on an outer surface of a first structure, wherein said seal ring is capable of being placed in said groove in a manner wherein it overlies said spring and parts of both of said first and second portions of the seal ring's inner surface contact said spring, and wherein if said spring and seal ring are located in the groove of the first structure and said first structure is inserted into a second structure that has an inner surface that presses on said outer surface of said seal ring, said minor portion of said outer surface of said seal ring will be pressed inwardly toward said spring, thereby causing a compression of said spring and causing at least a portion of said seal ring to flex about said groove in said seal ring.

15. A flexible coupling capable of connecting first and second tubular members to enable the transfer of fluid therebetween, said coupling comprising:

a tubular sleeve having a cylindrical inner area defined by an inner surface of said sleeve;

a seal ring holder that has a thru-bore and includes first and second end portions, wherein said first end portion of said seal ring holder is capable of being located within said interior area of said sleeve and includes an external endless groove;

a spring in the form of an annulus located within said groove in said seal ring holder;

a seal ring in the form of an annulus located within said

groove and positioned wherein it overlies said spring, wherein said seal ring has a radially-located outer surface that faces away from a center axis of said seal ring and, when in an unloaded condition, includes a leading, outwardly-protruding first portion and a trailing second portion, wherein said seal ring has a radially-located inner surface that faces toward said center axis and includes first and second portions separated by a groove; and

wherein when said seal ring holder is inserted into said sleeve, said inner surface of said sleeve will press on and thereby apply a load to said outer surface of said seal ring and cause the first portion of said outer surface of said seal ring to be pressed inwardly toward said spring, thereby compressing said spring and causing at least a portion of said seal ring to flex about said groove in said seal ring as the outer surface of the seal ring assumes a configuration that substantially matches said inner surface of said sleeve.

16. The flexible coupling of Claim 15 wherein said spring is in the form of a canted-coil spring.

17. The flexible coupling of Claim 15 wherein said spring is made of a metal material.

18. The flexible coupling of Claim 15 wherein said seal ring,

when in an unloaded condition, has an 'L'-shaped cross-section.

19. The flexible coupling of Claim 18 wherein when the first end of said seal ring holder is located in said sleeve, if said sleeve is then caused to contain a fluid with the seal ring preventing fluid from leaking out of said sleeve, the seal ring will be oriented whereby the top end of the 'L' of the seal ring's 'L'-shaped cross-section will face the fluid, and be acted upon by the fluid's pressure, while the foot portion of the 'L' will be forced into a wall of said groove of said seal ring holder.

20. The flexible coupling of Claim 15 wherein said second portion of the seal ring's outer surface, when seen in cross-section, is in the form of a substantially straight line and, when in an unloaded condition, has a first orientation relative to an adjacent side surface of said seal ring, and wherein when said seal ring holder is inserted into said sleeve, said first orientation will change and said second portion of the seal ring's outer surface will become substantially perpendicular to the adjacent side surface of said seal ring.

21. The flexible coupling of Claim 15 wherein the seal ring is made of a material that is at least partially made up of PTFE.

22. The flexible coupling of Claim 15 wherein when the seal ring is in an unloaded condition, a radially-oriented cross-section through a portion of the seal ring will show the first portion of said inner surface of the seal ring as a straight line that is substantially parallel to the seal ring's center axis.

23. The flexible coupling of Claim 22 wherein when the first end of said seal ring holder is located in said sleeve, a radially-oriented cross-section through a portion of the seal ring will show the first portion of said inner surface of the seal ring as a substantially straight line that is at a significant angle relative to the seal ring's center axis.

24. The flexible coupling of Claim 15 wherein when said seal ring holder is located exterior to the sleeve and said seal ring is in an unloaded condition, a portion of said second portion of the seal ring's inner surface will contact a portion of said spring and be oriented at an angle that substantially matches the orientation of said portion of said spring.

25. The flexible coupling of Claim 15 wherein when said seal ring holder is located exterior to the sleeve and said seal ring is in an unloaded condition, both of said first and second portions of the seal ring's inner surface will be in contact with said spring, wherein said inner surface's first portion will have

a first area of contact with said spring and said inner surface's second portion will have a second area of contact with said spring, and wherein both of said first and second areas of contact will be located proximate said groove in said inner surface of said seal ring.

26. The sealing system of Claim 25 wherein when the first end of said seal ring holder is inserted into said sleeve, said first area of contact between the first portion of the seal ring's inner surface and the spring will move away from said groove in said inner surface of said seal ring.

27. The sealing system of Claim 15 wherein said seal ring is in an uncut condition.

28. A flexible coupling capable of connecting first and second tubular members to enable the transfer of fluid therebetween, said coupling comprising:

a tubular sleeve having an inner area defined by an inner surface of said sleeve, wherein said inner surface comprises first and second adjacent surface portions, wherein said first surface portion defines a cylindrical area having a constant diameter and located proximate an opening in said sleeve, wherein said second surface portion defines an area in the form of a truncated sphere, wherein said second surface portion begins at

an end of said first surface portion distally-located from said opening in said sleeve and ends at a wall portion of said sleeve, and wherein said wall portion forms a stop for a seal ring holder that is movable relative to said sleeve and has a first end portion located within said sleeve; and

wherein said first end portion of said seal ring holder includes an external endless groove that contains a spring in the form of an annulus and a seal ring in the form of an annulus, wherein said seal ring is positioned wherein it overlies said spring, wherein said seal ring has a radially-located outer surface that faces away from a center axis of said seal ring and, when in an unloaded condition, protrudes outwardly from said groove, wherein when said seal ring holder is in a first position, said seal ring contacts the first surface portion of the sleeve, wherein when said seal ring holder is in a second position, said seal ring contacts the second surface portion of said sleeve, and wherein moving said first end portion of the seal ring holder in a direction away from said opening in said sleeve while said seal ring is contacting said second surface portion of said sleeve will cause an increasing rate of compression of said spring.

29. A method of installing a sealing system into an external groove of a seal ring holder, wherein said sealing system includes an annular canted-coil spring and an annular seal ring,

wherein said seal ring is made of a material having a resiliency that is substantially no greater than that of PTFE, said method comprising:

expanding said spring over a first end of said seal ring holder and then moving said spring into said groove whereby said spring will contract and rest atop a base surface of said groove;

placing a first portion of said seal ring over said first end of said seal ring holder and into said groove wherein it overlies a first portion of said spring;

pressing on said first portion of said seal ring to thereby compress said first portion of said spring and thereby cause said first portion of said seal ring to move closer to a proximate portion of said base surface of said groove;

while maintaining the compression of said first portion of said spring, placing additional portions of said seal ring over said first end of said seal ring holder and then into said groove and using said additional portions of said seal ring to compress additional portions of said spring until a final portion of said seal ring can be moved over said first end of the seal ring holder and into said groove; and

moving said final portion of said seal ring over said first end of the seal ring holder and into said groove.